U.S. Fish & Wildlife Service

Issue XIV 2007

Environmental Education In America

Connecting People with Nature

Cover Photo:
Along the Wildlife Drive circling the impoundment at the Edwin B. Forsythe National Wildlife Refuge.
Photo: Art Webster / USFWS

Insert:
A child checking her catch at a pond on the campus of the National Conservation Training Center.
Photo: Steve Hillebrand / USFWS

The New Jersey Field Office dedicates this *Environmental Education in America Connecting People with Nature* issue of *Field Notes* to Clifford G. Day, Supervisor for twenty years of our Ecological Services Field Station. Under his guidance, this newsletter has grown from a five-page document without benefit of photographic images to the forty-eight pages of the present edition. Cliff has shepherded *Field Notes'* odyssey from the single fold-with-insert of its maiden voyage in June of 1995 to the magazine-style presentation of the last three issues. Without his vision and tireless support, *Field Notes* would neither have come into being nor have grown into the valuable outreach tool it has become for the New Jersey Field Office.

Photo:
Birdwatching at the Edwin B. Forsythe National Wildlife Refuge's pond within the impoundment.
Photo: Art Webster / USFWS

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Environmental Education Works at Forsythe

Photos: Art Webster / USFWS

(Left) Using nets to explore the contents of a Forsythe wetlands. (Above) Schoolchildren look out over part of the Forsythe impoundment.

Arthur Webster, Outdoor Recreation Planner,
Edwin B. Forsythe National Wildlife Refuge

Look, there's one feeding! I see a bird bathing! Multiply this by 20 high-pitched exclamations about bird behavior as third-graders tally their observations. The bird behavior checklist has been a great way to get young students involved with birds without the complexity of identification. It is one of many activities refuge staff are piloting as we develop a more formal offering of environmental education curricula for students and youth groups.

Edwin B. Forsythe National Wildlife Refuge is world-famous for its abundant and diverse bird life. It also has a lot of neighbors. This 50,000-acre refuge is scattered along 50 miles of the Jersey shore from Galloway to Brick Townships. It is in one of the fastest growing areas of this densely populated state. The 2000 census showed a public school enrollment of 41,000 in Atlantic County and almost 72,000 in Ocean County. Besides the public schools, thousands of children are enrolled in private schools and home schools and are also active as well in scouting and other youth organizations. In 2005, Forsythe Refuge reached about 1,200 students and scouts with environmental education activities. There is tremendous potential for our program to grow.

The refuge's recently completed Comprehensive Conservation Plan identified the need for a visitor services plan as well as an environmental education plan. The Friends of Forsythe recently formed an Education Committee that will be helping the refuge with environmental education planning and program development. The refuge is also fortunate to have a volunteer house which can house eight environmental education interns.

We are presently promoting and using the Explore the World with Shorebirds! educator's guide that was recently released by the U.S. Fish and Wildlife Service. This outstanding guide is the curriculum for the Shorebird Sister Schools Program, a conservation education program designed for educators and their students. The content of Explore the World with Shorebirds CD-ROM includes chapters on connecting cultures, shorebirds, interdisciplinary classroom activities, field trip planning, and field trip activities. One of our volunteers has correlated the activities found within the guide to the 2004 New Jersey Core Curriculum Content Standards. A home school co-op used a number of the pre-visit activities for three months and came out to the refuge for three field trips.

In addition to school programs, we do a wide range of activities for Cub Scouts, Boy Scouts, Girl Scouts, and the Atlantic City Boys and Girls Club. We are also interested in partnering with schools in the Service's Nature of Learning program (see The Nature of Learning Program in New Jersey on page 35).

The Edwin B. Forsythe National Wildlife Refuge is a wonderful environmental education resource for the American public. Please come visit us and see for yourself how much we can teach you about New Jersey's wildlife.

Supporting Environmental Education in America

Division of Education building at NCTC : Ryan Hagerty / USFWS

NCTC Campus: Brian Jonkers / USFWS

If you are interested in training, planning assistance, resources or technical support for designing and developing programs to connect young people with our natural wildlife and its habitat, contact the NCTC Division of Education Outreach at 304/876 7319.

Janet Ady, Division Chief, Division of Education Outreach
National Conservation Training Center, U.S. Fish & Wildlife Service

Nestled within the U.S. Fish & Wildlife Service's National Conservation Training Center (NCTC) in Shepherdstown, West Virginia is a cadre of highly qualified, experienced professionals who comprise the Division of Education Outreach (DEO). Their vision is to serve as a catalyst for inspiring conservation through excellence in education, outreach, and partnerships. These motivated individuals serve conservation professionals by providing training, program coordination, technical support, and distance learning.

Environmental education training and program support is a fundamental component of the Division's offerings. In fact, the very first training offered by DEO in the early 90s was the Environmental Education Methods course. This course, instructed by U.S. Fish & Wildlife Service experts, provides a foundation for designing and developing hands-on environmental education programs that will meet school educational standards. The companion course, Developing Teacher Training, teaches how to plan and conduct training for teachers so that they can be effective leaders of conservation education programs, with public support. Courses are also available to learn about an array of lesson plans and resources available for programs on specific topics, such as Migratory Bird Education.

Because so much education occurs outside of the formal classroom arena, the Education Programs for Youth: School's Out course was developed. This course draws on the expertise of educational leaders in a camp or after-school environment to help participants design enjoyable, interactive learning experiences for children.

The Education Program Evaluation course is extremely valuable in helping students to determine if programs are meeting their objectives and to develop ideas for program improvement. This course has been so popular that it has been adapted by the University of Wisconsin at Stevens Point and other partners for distance learning delivery, online.

Once U.S. Fish & Wildlife Service employees have skills and grounding in environmental education, they don't stop there. The Division also supports research and development of education tools used to design, develop, and evaluate education and outreach. The DEO also works with the other parts of the U.S. Fish & Wildlife Service to help "practice what we preach" in the training courses, by providing support and consultation on education and outreach projects. The National Conservation Training Center has helped initiate, field test, and support education and outreach programs that address migratory birds, wildlife trade, endangered species, wetlands, schoolyard habitat, urban wildlife, and other topics.

National level education programs are also coordinated for the U.S. Fish & Wildlife Service by the DEO. To date, partnerships include 4-H and Extension, both Boy Scouts and Girl Scouts, and the international Shorebird Sister Schools Program.

The Learning Laboratory housed in the DEO building allows pilot testing of programs for local schools for later replication within the U.S. Fish & Wildlife Service on a broader scale. Currently, the Planning of Wetlands teacher training program is underway, a program which has enabled teachers to create wetland outdoor classrooms at their schools. The Rhythms of the Refuge education program design tool was field tested at several National Wildlife Refuges with Division Support, and a new online training course is in the design phase to assist U.S. Fish & Wildlife Service field stations with the implementation of this program.

An educated and involved public is essential to the success of nationwide conservation efforts. Through the programs and courses it offers, the DEO seeks to inform, equip, and inspire educators to foster an electorate that is knowledgeable of and sympathetic to environmental concerns.

Reach Out—Before It's Too Late

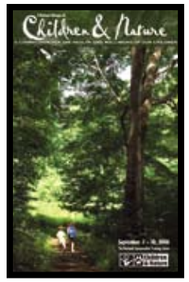
National Dialogue on Connecting Children to Nature, September 8 and 9, 2006 at the National Conservation Training Center. Photos: USFWS

John R. Lemon, Director, National Conservation Training Center
U.S. Fish & Wildlife Service

On September 8 and 9, 2006, the U.S. Fish & Wildlife Service's National Conservation Training Center (NCTC) held a National Dialogue on the subject of Connecting Children to Nature—for the Health and Well-Being of Our Children. Many of us in the conservation community have been concerned for years that the American people are growing less connected to the land and nature. This is especially acute with our children. A recent study reported that visitation to our National Parks is down by 25 per cent. The outdoor recreation industry reports that sales of "high-end' gear is stronger than ever, but sales of "entry-level" gear is way down. As conservationists, our concern has been for our conservation mission and the future of the land and resources that we care so much about. How can we conserve natural resources in the future if our population grows more and more detached from those resources? How can we accomplish our mission if the American people don't care?

Two years ago, Richard Louv published a book entitled *Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder.* What impact, Louv asks, has the growing disconnection from nature had on our children? Louv documents a connection between decreasing contact with nature and the out-of-doors to problems such as childhood obesity, diabetes, ADHD, and other problems seemingly on the rise with our children. The book has risen to The New York Times best seller list for non-fiction, capturing the interest of health care professionals, educators, child advocates, parents, and grandparents.

Visiting NCTC in December 2005, Richard Louv told us that he has noticed the various groups interested in tackling this problem do not seem to be working together nationwide to build the needed synergy. Hence,



In speaking about his experiences taking his own children fishing, hunting, and camping, U.S. Fish & Wildlife Service Director Dale Hall said it is not so important which outdoor activity we engage in, but rather "the opportunity [we give the kids] to make their own choice because they've had the experience. They've felt it."

Secretary of the Interior Dirk Kempthorne said, "What brought us together? What brought this varied group of powerful individuals together, perhaps for the first time under one roof? The nation's children brought us together."

the concept for the September 2006 conference here at NCTC. We worked diligently to draw participants from all interested sectors. We had panels of experts who focused on the connection between children and nature in four areas: health, education, media and popular culture (TV and video games), and finally, the built environment (how we build our communities and transportation infrastructure). Following these presentations, small groups broke into facilitated sessions to discuss how we can work together to develop solutions. Over 330 people attended the conference, including Interior Secretary Dirk Kempthorne and U.S. Fish & Wildlife Service Director Dale Hall.

The conference was just the beginning of a long-term effort that will eventually lead to concrete action. Larry Selzer, President of The Conservation Fund—a conference co-sponsor—has committed to raising funds for an 18-month effort called the Children and Nature Forum. The Forum will develop and fund the ideas and pilot projects that began to take shape at the conference. These efforts provide an exciting opportunity to focus on the children of America.

Many people would like to get their children outside and moving, but perhaps they feel inadequate because they do not understand the natural world themselves. We need to help such people understand that what is important is not having all the answers but sharing a sense of wonder. Nature is something that the U.S. Fish & Wildlife Service, our volunteers, and our retirees do understand, and we carry tremendous credibility with the American people.

To the task of environmental education, the U.S. Fish & Wildlife Service offers a land base, facilities, legitimacy, credibility and most importantly, a passion for conservation of the natural world. The U.S. Fish & Wildlife Service encourages children and their parents to visit refuges and get involved in conservation efforts. The U.S. Fish & Wildlife Service can provide education programs such as The Nature of Learning program at the New Jersey Field Office or sponsor essay and photo contests about nature, then bring the participants out for a visit when the birds are on the refuge or the fish are spawning. Our National Wildlife Refuges also offer opportunities to fish or hunt or bird watch, or simply to walk in the woods or across a prairie. We gladly partner with local volunteers, retirees, birding and fishing clubs, and teachers in this work.

Human beings were hunter/gatherers for millennia, and the connection to nature is still alive inside us, but with each passing generation, it fades to an ever more distant memory. We must rekindle the flame. We must work together to build on the energy and enthusiasm that has been reawakened by Richard Louv's book. We must turn things around for future generations.

Building Awareness of Natural Systems

Ruby-throated hummingbird.

Photograph. Steve Maslowski / USFWS

For more information on the types of programs New Jersey Audubon Society offers, visit www.njaudubon.org.

Luna moth top view and front view.

Luna Moth Photographs. Mark Moran

Sweetgum

Milkweed

Oak

Images. USDA-NRCS PLANTS Database / Britton, N.L., and A. Brown. 1913.

Dale Rosselet, Vice-president for Education, New Jersey Audubon Society

Most mornings I walk my yard.
I negotiate thousands of sweetgum pods scattered across the lawn and keep tabs on the growth of perennials peeking through leaf litter piled up in numerous gardens. This ritual is an important part of how I stay connected to nature. It's easy; it's real; it's tied to the seasons and it serves as my grounding in this age of nature-disconnect.

Many people would not consider this ritual to be "environmental education" yet it supports and nurtures a key element to the environmental education process: awareness. One cannot be moved to enjoy, respect, or preserve natural systems, if one is not aware that they exist and that they support life on Earth.
For the last 24 years, I have worked in various education capacities for the New Jersey Audubon Society, the oldest and largest conservation organization in New Jersey. Our mission is to preserve open space and species biodiversity, and we do this through conservation, wildlife research, and environmental education. (Although on similar tracks, the New Jersey Audubon Society has no formal affiliation with the National Audubon Society.)

The New Jersey Audubon Society feels that environmental education is a process; it is a means to help people become more environmentally literate. Environmental education is for all ages; it permeates actions taken in the home, in our yards, those done at school, in our workplaces and at places of worship as well as throughout all levels of government. Environmental education provides the means to understand basic ecological systems that support life on Earth, teaches the skills that an informed citizen may need to make quality-of-life decisions, and provides opportunities for people of all ages to develop behaviors that benefit the environment.

Teacher/naturalists with the New Jersey Audubon Society are committed to providing the best natural history and nature recreation opportunities for people of all ages. With professional staff at ten education centers throughout the state, the New Jersey Audubon Society delivers quality programs to over 65,000 toddlers, school children, teenagers, teachers, adults, and retirees a year. We firmly believe that learning about what is in our own backyards will make a world of difference.

Think of these:

Ruby-throated hummingbirds fly nonstop across the Gulf of Mexico each spring as they migrate northward as far as Canada. You can provide appropriate flowers in your yard to provide nectar for the hummingbirds.

Oak trees flower at about the same time warblers return in the spring; the oak flowers attract insects upon which the warblers feed. You can maintain healthy oak trees in your yards to ensure a food source for these migrants.

Monarch butterflies require a specific host plant where they will lay their eggs. You can plant milkweed for them. No milkweed, chances are, no monarchs.

Nature is all around us – one doesn't need to go far to find wonderful discoveries; it just takes a little time and the desire to want to know how natural systems work.

By the way…the reason I put up with all those sweetgum pods is that I recently found out that sweetgum trees are one of the host plants for the caterpillar of the luna moth – an extraordinarily beautiful, large green moth. The adult lays its eggs on the leaf, the caterpillar eats the leaves, and when it is time for the caterpillar to go into cocoon, it rolls itself up in a sweetgum leaf, drops to the ground in the autumn, and over-winters in the leaf and pod litter. Mulch the leaves, dispose of the pods? Not if I want to see more luna moths.

Expanding Through Partnerships

Teaching teachers to teach at Liberty State Park.

Within sight of the Statue of Liberty, students seine for samples.

Lori Garth, Resource Interpretive Specialist, Liberty State Park.
Elizabeth Faircloth, Project Learning Tree State Coordinator

Amazing things happen when people work together—which is why, since 1984, Liberty State Park's Interpretive Center has been enlisting the help of partners to meet the challenge of delivering quality environmental education programs to an ever growing diversity of audiences.

Located on the shores of the Hudson River estuary in Jersey City, New Jersey, Liberty State Park has become a green oasis for surrounding urban communities. More than half of the nearly 4,000 students who participate in programs annually are local residents, while the remaining represent all other areas of the state. And the demand for services continues to grow.

Environmental Education in New Jersey State Parks and Forests
Administered by the Department of Environmental Protection's Division of Parks and Forestry, Liberty State Park is only one among New Jersey's many state parks and forests that offer environmental education for school groups and interpretive programs for the general public. To find out more, visit www.njparksandforests.org

Project Learning Tree
The NJ Division of Parks and Forestry also is the state sponsor for Project Learning Tree. This interactive, hands-on, interdisciplinary environmental education program is designed for educators working with students in grades preK-12. Project Learning Tree makes learning fun while teaching students "how to think, not what to think" about the environment. Professional development workshops are available for formal and non-formal educators, as well as scout leaders, home school educators or anyone interested in working with students and environmental education. To find out about Project Learning Tree workshops in your area, or to schedule a workshop for your school, visit www.plt.org, or contact the state coordinator: Elizabeth.Faircloth@dep.state.nj.us.

Photos. NJ Division of Parks and Forestry

Demonstrating wild bird calls for a young audience.

Partnerships have enabled Liberty's Interpretive Center to expand both the delivery and array of programming, while maintaining the same level of quality and remaining true to the park's mission. All of the Center's programs are resource-based and connected to the following overall educational objectives outlined in the park's Interpretive Plan:

1. To develop an understanding of the inter-relationships among organisms which inhabit the local environments.

2. To recognize human impacts, both advantageous and deleterious, upon the living creatures within these environments.

3. To foster a sense of stewardship toward the resources within these environments.

The Center's focus on the natural history and ecology of the Hudson River and its environs lends itself to vast possibilities. Two distinct but related partnerships being developed for future programming involve oyster gardening and butterfly gardening.
The Oyster Project will rely on the New York/New Jersey Baykeeper's office for the expertise, supplies and training. A local charter school in Jersey City will develop the curriculum and provide the students who will care for the oyster floats, and the park will provide educational programs on estuary ecology and water quality, site access and overall project management and support. Similarly, the Butterfly Education and Enhancement Project will include expertise and training from a butterfly conservation organization, volunteer work from a local Eagle Scout, and management and support from the park's interpretive staff. Both of these projects will enhance and supplement the park's basic programs in estuary ecology and insect ecology, contribute to a greater understanding and appreciation of the resource, and, perhaps most importantly, foster stewardship.

Involving students in meaningful, hands-on learning encourages critical thinking and problem-solving, and helps to build self-confidence and a sense of ownership in the resource. By inviting community and environmental groups and other agencies to share their mission and contribute to ours, we are building cooperation and support for all participants.

What High School Students Think About Conservation

Laura Wray-Lake, Ph.D. Candidate in Human Development and Family Studies, Pennsylvania State University

Erin Gallay, Global Rivers Environmental Education Network Program Manager for Earth Force

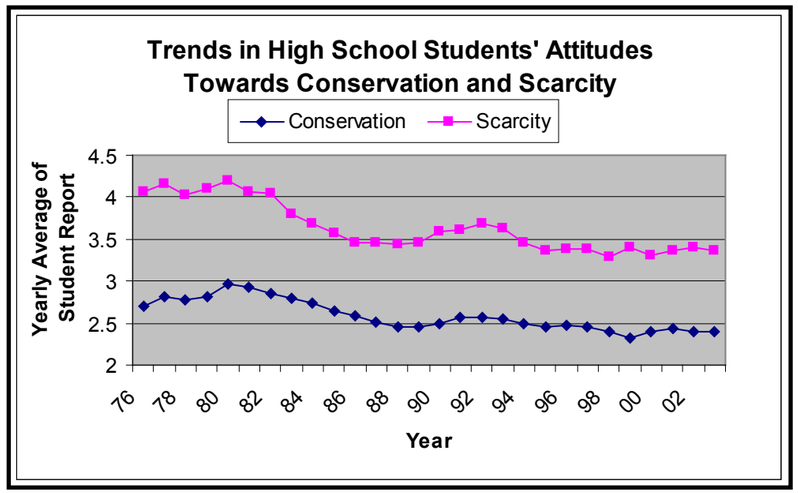
Constance Flanagan, Ph.D., Professor of Youth Civic Development, Pennsylvania State University

Conventional wisdom says that youth today are more environmentally aware and responsible than were youth in the past. After all, today's younger generation has grown up in a world where household recycling has become common and Earth Day is an annual celebration. A Google search on "youth" and "environment" returns some 51 million hits. Thus, we were surprised by the results of our study of trends in young people's environmental attitudes and behaviors over the past 27 years. We analyzed data from Monitoring the Future, a federally funded national survey of the attitudes, values, and behaviors of high school seniors, conducted annually since 1976.

We found that young people today are less likely than were youth in the late 1970s and early 1980s to believe that resources may be scarce in the future and that Americans may have to learn to be happy with fewer things. This has particularly been true since the mid-80s. Likewise, youth today are less inclined than were youth in earlier generations to alter their lifestyle to conserve natural resources by, for example, taking public transportation. We do not know if there are similar trends in attitudes and behaviors among adults over the same period of time.

Clearly, this is a wake-up call that more environmental education is needed. The figure below displays the average response from high-school students each year about their conservation behaviors and beliefs about scarce resources. No doubt, environmental educators will see a familiar pattern, *i.e.*, that beliefs and behaviors go hand in hand. The good news in these results is that during times when youth believe that resources are scarce and that it is important to conserve, their conservation behaviors reflect that belief.

Both knowledge and awareness have long been core features of environmental education programs, but environmental educators also know that awareness is not enough. To be motivated to act, people need to learn what they can do and also to develop behavioral skills through practice. Effective environmental education transforms young people's relationship with the environment by integrating awareness, scientific knowledge, skills, and action. No matter what the subject matter, incorporating all of these elements is important, *e.g.*, learning how to measure water quality, having the hands-on experience of keeping tabs on the local river, analyzing the data, and raising awareness of any issues discovered with local stakeholders.



Note: Conservation is measured by 4 items: three ask one's willingness to cut down on driving to save gas, cut down on electricity to save energy, and cut down on heat to save electricity, and the fourth item reads, "I make a personal effort to preserve and protect the environment." Responses ranged from 1 (not at all) to 5 (yes, quite a bit). Awareness of scarcity is measured by one item, "There will probably be more shortages in the future, so Americans will have to learn how to be happy with fewer 'things'," and responses ranged from 1 (disagree) to 5 (agree). Both trends reflect the averages of student responses over time.

Environmental education should foster knowledge, values, attitudes, and an understanding of humans' relationship with the environment with the goal of responsible environmental behavior, but should not be about teaching a correct behavior. Rather, it aims to provide individuals with the ability to weigh the various sides of an environmental issue, formulate their own informed opinions, and take action to resolve specific issues should they deem that actions are necessary.

People also have to believe that their actions will make a difference. In fact, when we are aware of the magnitude of some environmental issues, we can feel that our individual actions are a tiny drop in the bucket. It is especially important that young people understand that environmental change results from collective action and that ultimately we make a difference by changing habits over a lifetime.

Regarding individual behavior, another of our findings is relevant. Each year youth were asked the following two questions: a) whether they felt the government should take actions to solve environmental problems, and b) how much effort they personally took to conserve energy and protect the environment. Our finding is straightforward: during times when youth think the government should be responsible for the environment, they also make a personal effort to conserve and protect environmental resources. Conversely, in years when youth do not think the government should be responsible, they are also less likely to take personal action.

There are some take-away lessons for environmental education from the trend data in youths' conservation attitudes and behaviors. Since youths' beliefs that resources are scarce and their conservation behaviors go hand-in-hand, it is important to emphasize that resources are indeed scarce and that there are actions we all can take to conserve them. In addition, it may be useful to help young people learn how to strike a balance between consumption and conservation. In fact, the methods used by environmental educators that we described above are aimed at teaching this balance. In many ways environmental education teaches lessons in civics. Its goal is an informed citizenry that is environmentally literate, capable of weighing evidence about the use of public spaces and natural resources, and able to take action knowing that decisions about natural resources and how we want to live are collective choices.

Raising Environmentally Conscious Students

For additional information on the NY/NJ Baykeeper Oyster Restoration program please contact: Doreen Silakowski dsilakowski@hhrs.us or Meredith Lock Oyster Program Manager NY/NJ Baykeeper 52 West Front Street, Keyport, NJ 07735, Phone: 732/888 9870, Fax: 732/888 987, http://nynjbaykeeper.org





Photos: Silakowski / Henry Hudson Regional School

The many tasks of oyster gardening.

Doreen Silakowski, Science Teacher and Volunteer Oyster Garden Advisor, Henry Hudson Regional School

It is the first week of September, and educators are searching for innovative methods to motivate student learning. From experience, teachers know that strategies must adapt to student abilities, and what works for one class or individual student does not always work for another. So what is my solution? Take the students Oyster Gardening!

Henry Hudson Regional School is on the hill adjacent to Twin Lights State Park overlooking the Atlantic Ocean and Gateway National Recreation Area at Sandy Hook. We are fortunate to be in close proximity to a bayshore region providing important ecological, recreational, and economic services for people and wildlife. An active local environmental commission within the school community introduced me to the perfect opportunity to get my students involved with restoring our native American oysters (*Crassostrea virginica*) to an estuary ecosystem. This provided me a way to teach my students scientific attitudes and methodology and at the same time to help them become responsible stewards of their environment.

Oysters are a keystone species that play a natural role in cleansing our waterways. When Henry Hudson himself first explored our region of the Hudson-Raritan estuary in the early 1600s, oyster reefs covered 350 square miles of estuary from Sandy Hook north to the Hudson River, to Raritan Bay, the Navesink and Shrewsbury Rivers, the Arthur Kill, and Newark Bay. Up until 1900, these tasty bivalves also supported an extensive commercial fishery in the metropolitan area and provided habitat for commercially and recreationally important fish as well as other marine organisms. Oysters act as a natural water filter to help clean their ecosystem. Unfortunately, the oyster population fell dramatically after 1900 due to overharvesting, pollution, disease, and siltation.

Since 1999, the NY/NJ Baykeeper has been working to restore oyster beds in the Hudson-Raritan estuary by placing thousands of oysters on newly created beds with the help of volunteers. Henry Hudson Regional students have been dedicated Oyster Garden Volunteers for five years. During that time the NY/NJ Baykeeper Oyster Restoration program has been a valuable tool in teaching my students a number of scientific topics that relate to real world issues. The major goal of any Science Department should be to have students comprehend and demonstrate mastery of the scientific method and collaborative skills, acquire and comprehend knowledge of the subject matter, and demonstrate an awareness of the necessity for conserving and protecting the environment. The Baykeeper oyster program has enabled me to take my students out into the field and teach them to collect and correlate data as well as to be responsible environmental stewards within their community. It has been learning disguised as fun. In fact, many of my students were not initially aware of the educational value of oyster gardening.

Over the years I have supplemented our oyster garden involvement by scheduling Baykeeper speakers in class and on-site, and by developing through practice additional scientific skills which extend our lessons into marine chemistry and environmental issues. For example, students measure water quality parameters. Local newspapers have featured Henry Hudson Regional students' commitment to oyster gardening, and our involvement with the oyster program has encouraged the school to participate also in New Jersey Project WET (Water Education for Teachers) and Bayshore Waterfront Council grant projects.

As a science educator, my mission is to expand teaching and learning beyond the classroom and to stimulate awareness of the need to conserve and protect the environment. The NY/NJ Baykeeper Oyster Restoration program has helped me turn my students into enthusiastic oyster gardeners who have made the connection between scientific practice and real world issues, in the process truly becoming environmentally conscious individuals.

On Target for Continued Success

Hunter education DVD .

Paul Ritter, Supervising Biologist, New Jersey State Hunter Education Administrator, New Jersey Division of Fish and Wildlife

New Jersey hunter education has a rich history dating back to 1955 when New Jersey became only the second state in the country to pass legislation requiring mandatory hunter education. Since its inception, when local volunteers would invite students into their homes for a course on firearm safety, the program has changed dramatically. It has evolved from small, informal classes, to more formalized instructor teaching teams, to centralized teaching locations with instructors following standardized course curriculums.

The most important change came in 2002 when the program format was totally revised. The traditional format, consisting of two evening classroom sessions and one weekend day field experience, was replaced with a modified home-study-based course developed around an educational packet consisting of a DVD/video tape, student manual, and student workbook. This new format has changed the program's downward trend in recruitment and has been embraced by its volunteer hunter education instructors.

Of the many reasons for changing the program format, one stood out above others. Since the mid-1980s a steady decline in student attendance in hunter education has occurred. Nearly 10,000 course completion cards were issued in 1995 but only 5,297 in 2001. Through meetings with volunteer hunter education instructors, feedback from our customers, and observations at the classes it became evident that both the application process (a mail-in registration form) and student scheduling (with three mandatory sessions) had become a major roadblock. In the fall of 2001, program personnel began work to develop a modified home study course format to address these issues.

The new format took the existing two week-night classes required for each type of course (archery, shotgun, and rifle/muzzleloader) and incorporated everything into a single hour- and-45-minute DVD/video. Since not all of our students are visual learners, a comprehensive student manual accompanied the video. A student workbook was added to this teaching packet to test the student's knowledge of the course material. The new course format and material allowed students to work at home at their own pace, eliminating the need for two
week-night classroom sessions.

For more information about hunter education in New Jersey, visit
http://www.state.nj.us/dep/fgw/hunted.htm

Kodachrome by Ozzie Sweet

Ringneck hunting — circa 1962.

Our volunteer instructors now lead a one-day field session including a field walk, live fire exercise, and written exam to cover the archery, shotgun, and rifle/muzzleloader courses. Students attend the field session and are grouped with hunter education instructors to lead them through a number of "teaching stations" where topics such as treestand safety, blood trailing, zones of fire, wildlife identification, don't shoot situations, and responsible firearm and bow handling are taught. After completion of this field walk, students are sent to the appropriate ranges for the classes they are taking. All three disciplines (archery, shotgun, and rifle/muzzleloader) require a live-fire shooting segment. The day ends with a written exam that all students must pass with a minimum score of 80 percent.

The access and scheduling roadblock was removed by posting hunter education class dates online and allowing students to register for a class that best fits their schedules. Teaching facilities are located throughout the state and are placed so that commuting time is limited to no more than a one-hour drive.

This format change has resulted in a number of successes. First, the percentage of registered students who actually attended a class rose from 50 percent (in the traditional program) to well over 80 percent with the new format. Also, hunter education instructors continue to comment on how well their students are prepared when they arrive at the field session. They believe that this elevated level of knowledge allows them to conduct a more advanced course. Customer feedback has been extremely positive. The new format has also provided us with an unanticipated outcome: the video has become an excellent retraining and recruitment tool. With a great deal of the work now completed at home, many people in addition to students watch the video. Student recruitment continues to increase since the 2002 transition to this new format. We are confident this change will ensure that the tradition of hunting in New Jersey continues.

The Marine Academy of Technology and Environmental Science

Peg Roma, Principal, Marine Academy of Technology and Environmental Science, Retired

On September 22, 2006, the long-awaited Ribbon Cutting Ceremony for the Marine Academy of Technology and Environmental Science (MATES) in Manahawkin, New Jersey took place under sunny skies and with much local fanfare. Our seven-year-old school is comprised of students in grades 9 through 12 who want to learn more about our environment. As the newest addition to the Ocean County Vocational School District, MATES has already graduated two successful senior classes (2005 and 2006); until completion this year of the Manahawkin campus, the Academy shared a building at the Vocational School District's Toms River Center. The new facility is a high tech dream that has been years in the making. Input from scientific experts and the staff itself has produced labs that rival those of many colleges. Scientific equipment companies are providing materials and technical assistance to be showcased in our labs and programs.

Located just a few miles from Barnegat Bay, the Atlantic Ocean, and the New Jersey Pinelands, the Academy uses the surrounding areas as an outdoor classroom. Fieldwork and research are a mandatory part of all science classes. Besides a full college preparatory curriculum, we require at least 40 hours in the sciences, which include Marine Science, Marine Biology, Marine Chemistry, Ecology, Environmental Science, and Oceanography as well as the more traditional high school offerings. Curricular integration encourages other disciplines to join in this fieldwork and research. We offer college courses on site.
For example, we are cooperating with Ocean County College for our teachers to offer their Environmental Science and English 4 classes on the MATES campus. Other similar collaborations are being planned. Partnerships with local agencies and groups bring experts to our classrooms and the students to internships in the field.

If you are interested in learning more about the Academy or becoming a part of our advisory committee please contact us at Acarrol@mail.ocvts.org.

Photos: MATES/OCVTS

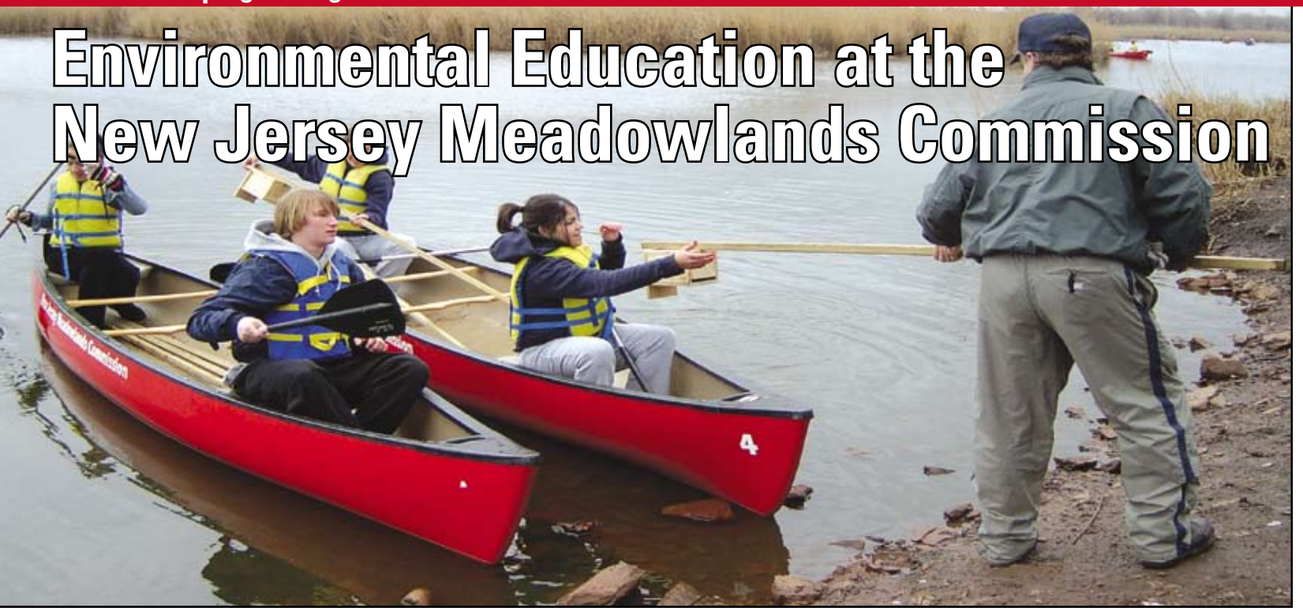
Students watching fish swim in a laboratory at the Marine Academy's new campus.

The Mission of MATES is to provide an opportunity to students in Ocean County to become critical thinkers and problem solvers. Students at the Academy participate in an intimate, integrated, and challenging curriculum with a focus on marine and environmental science. MATES empowers its students with skills important to post-secondary study and employment in a global society.

Our students share their knowledge and enthusiasm through outreach at various local elementary and middle schools. In addition, the students have presented their research at conferences such as that of the National Association of Science and the American Junior Academy of Science over the last few years. Although not all of our graduates have gone directly into the sciences, most have incorporated their love of the ocean and the environment into their career choices, such as environmental engineering and law.

Now that the physical needs of the Academy have been taken care of, the administration is expanding its advisory committee and establishing new and exciting agreements with various colleges to list MATES courses they will accept as meeting their curricular requirements. Continuing a seven-year tradition of academic excellence, MATES is actively building an ever stronger program in Technology and Environmental Science.

Environmental Education at the New Jersey Meadowlands Commission



Photos: NJMC

Students use Meadowlands Commission facilities to further their education on environmental issues.

Robert Ceberio, Executive Director, New Jersey Meadowlands Commission

Who ever heard of a zoning and planning agency running a nature center with classrooms and teacher training? The New Jersey Meadowlands Commission has come to believe that land-use regulation and local planning cannot achieve desirable results unless the public at large understands the benefits of living within healthy ecosystems. As earth's human population increases, finding our proper niche within the global ecology becomes ever more crucial if environmental security is to be maintained. That is why this agency works hard at environmental education. Let me show you what I mean.

The 10,000-square-foot expansion of the Meadowlands Environment Center educational facility, scheduled for completion in the late fall of 2007, will aim for a gold rating by the U.S. Green Building Council—a first for State-owned buildings in New Jersey and the beginning of an upgrade in the environmental friendliness of the New Jersey Meadowlands Commission's entire Lyndhurst campus. It will include an observatory, lab, and three classrooms for high school environmental education.

The building will be an environmental lesson in itself. We will install photovoltaic cells on the roof of the new building as well as in the parking lot to supplement the energy supply. Up to 20 percent of the building components will be from recycled material. Waterless systems and recycled water will be used for plumbing. Drought-resistant, water-efficient, native landscaping with vegetative swales will reduce stormwater runoff. Innovative wastewater technologies will decrease potable water consumption. Ultrahigh-efficiency heating ventilation and air conditioning systems will be installed. We will utilize day lighting and energy modeling to enhance energy conservation.

After the expansion's completion, students from Lyndhurst High School will have access to a new pilot field high school with state-of-the-art resources for learning biology, physics, astronomy, and, potentially, earth science and urban planning, with classes finely tuned to the Meadowlands ecosystem. We hope that these students will return to classrooms, communities, and dinner tables sharing the knowledge they've gained.

Additionally, the Board of Commissioners has allocated $80,000 to establish a new curriculum at the environment center designed to be more inclusive for those with disabilities. As part of this effort, we are developing an Educational Resource Center to increase the participation of individuals with disabilities in environmental outreach and education by promoting new strategies, new teaching techniques, and new technologies.

Eco-tourism programs will be broadened to thirty pontoon boat tours and a series of guided canoe tours along the Hackensack River, supplemented by a regional guidebook in English and Spanish developed by the New Jersey Audubon Society. One thousand guests participated in such tours in 2006.

A new mindset is taking hold in the Meadowlands, thanks largely to the New Jersey Meadowlands Commission's outreach. Officials once contemplated filling 3,700 acres of wetlands for development. Now we've placed 8,400 acres under protection. Reports from the 1980s, for example, showed our waters sustained only small, pollution-tolerant fish. But we now find ourselves on the road to recovery and beyond.

We are also approaching education from a strategic policy perspective. The new Meadowlands Master Plan and its accompanying zoning regulations include promoting environmental awareness in the metropolitan region utilizing regional classrooms and civic centers, and reaching out to new constituents. Besides building better educational bricks-and-mortar infrastructure, the plan calls for sharing and interpreting scientific data with the public. This land-use agency is now incorporating environmental education into its core activities, right alongside engineering, building inspections, and wetlands management.

The young people who will enjoy the newly expanded Meadowlands Environment Center will one day lead the effort to preserve and protect our natural resources. A long-term investment in early and continuous environmental education will make a difference. And, if it's working here, in what was once viewed as a scar on the Garden State, it will work anywhere.

First Place Winners in The Nature of Learning Art Contest

Stafford Township Intermediate School
Stafford Township, Ocean County, New Jersey

The Nature of Learning, the U.S. Fish & Wildlife Service's "outdoor classroom-," experience-based environmental education program, consistently seeks to connect children with nature. One of the most important goals of The Nature of Learning is to build environmental awareness into all aspects of the partner schools' curricula. So when the New Jersey Field Office began to plan this issue on environmental education, we realized it offered us a wonderful opportunity to integrate ecology with the arts at Stafford Intermediate, then our Nature of Learning school. We decided to sponsor a contest for student essays, pictures, and poems on environmental themes and publish the first place entries in each category in Field Notes. Through Hooked On Fishing—Not On Drugs, a program (sponsored by the Future Fisherman Foundation) in which Stafford fifth-graders participate each May, students are taken to nearby Lake Manahawkin, where they are given instruction and practice in the skills of angling. The Art Contest in May 2006 encouraged students to reflect on their experiences through drawing or writing poetry or essays. At the end of the school year, the New Jersey Field Office's Nature of Learning program presented awards to the students winning first, second and third place and honorable mention in each of the three categories. (An article and a picture of the presentation may be viewed on our website, http://www.fws.gov/northeast/njfieldoffice.) These pages proudly present the first-prize-winning drawing, essay, and poem of our contest.

The NATURE Of LEARNING

Photo: USFWS

The Nature of Learning's lead teacher, Ms. Cathy O'Leary (left), and the NJFO's James Cramer (right),with the award winners from Stafford Township Intermediate School Nature of Learning program in Manahawkin, New Jersey.

Why I Like Learning in Nature's Classroom

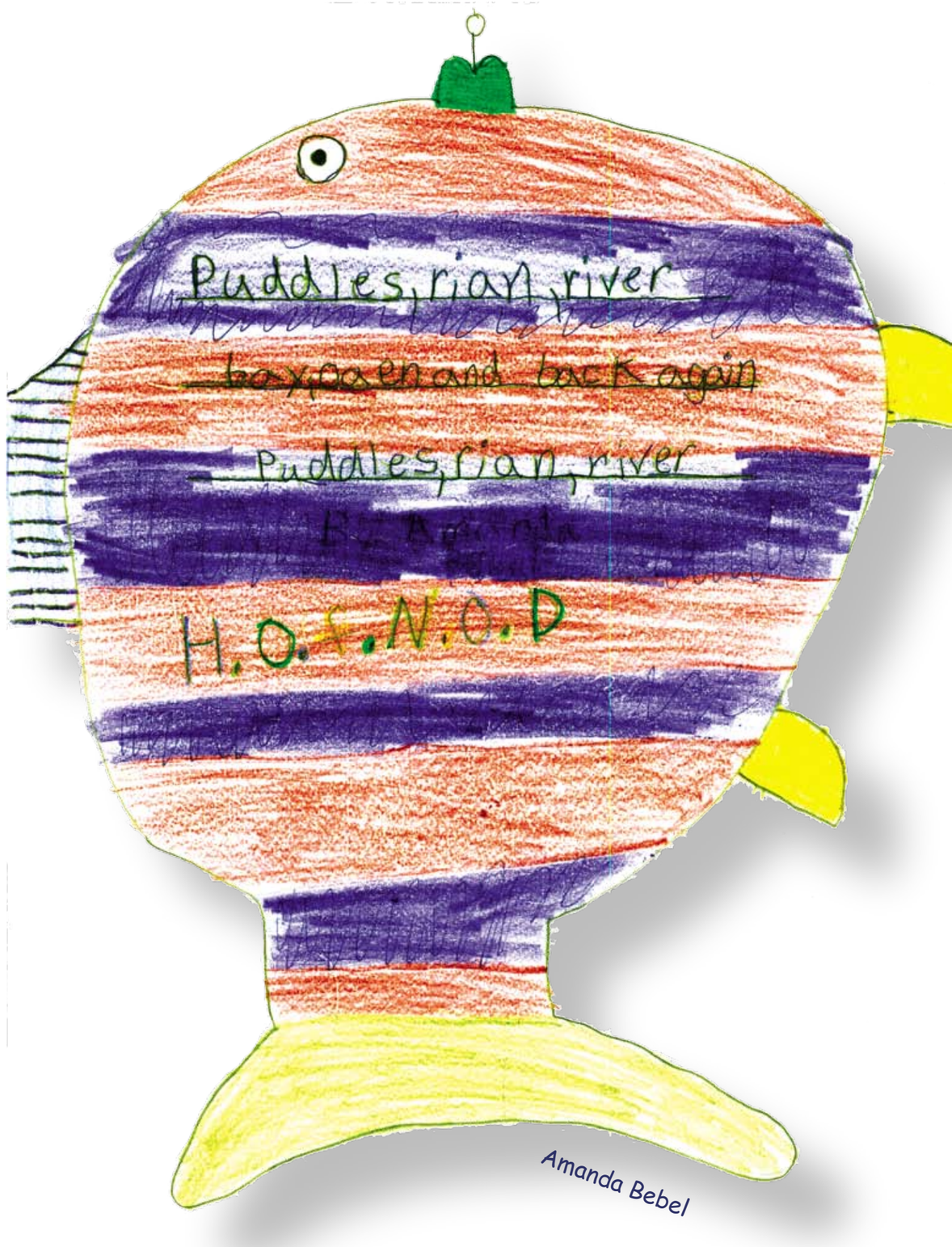
There are several reasons why I like learning outside. The first reason is it's nice and peaceful outside, and you have lots of space.

The second reason is you're almost always inside either in school or doing your homework. I think it was a great idea to have the H.O.F.N.O.D. trip because it gave you a chance to learn in school and outside. Two of the things I learned in school was how there are all different kinds of ways to cook fish. Another thing I learned in school was how to properly take a hook out of the fish's mouth so you won't hurt it.

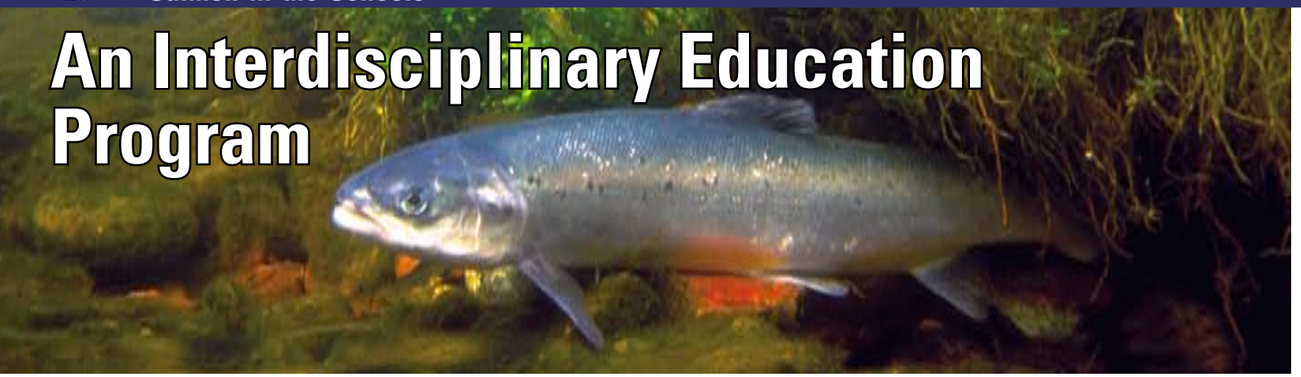
There are lots of things I learned when I went to the lake. Like I learned what you should do and what you shouldn't do in a canoe. Like you should wear a PFD, which stands for personal flotation device. You should also keep all of your stuff in a waterproof bag but don't bring too much stuff with you because if you put it in the back of the canoe then you sit in the front then one end will sink. Another thing I learned was how little things we do cause pollution. For example, mowing the grass, littering, not picking up after your pet if you take them for a walk, and many more.

I think that they should hold some classes outside because I think that a lot more kids would pay attention because it's calm and peaceful, and it is gorgeous on a sunny day. I think if everybody spent more time outside then everybody would be nicer to each other because the nature would make everyone calmer than they are. Those were five reasons why I like learning in nature's classroom. I hope you do too.

Jinelle Nevoso



An Interdisciplinary Education Program



Atlantic salmon in a typical habitat setting.

Janice Rowan, Connecticut River Coordinator, U.S. Fish & Wildlife Service

Some adults might say we look silly, but the kids love it as I stand before them disguised as a salmon and Sean Kruger, our summer intern, presents himself as a snorkeler biologist. On this beautiful spring day we have come to speak to a group of elementary school students about the Connecticut River Atlantic Salmon Restoration program. Two teachers active in the Atlantic Salmon Egg Rearing program have invited us here, encouraging us to "do something the kids will not forget." Something the kids will not forget—always a good educational strategy. We hope our presentation fills the bill!

For first- and second-graders, these students are very knowledgeable. They're engaged, asking us intelligent questions about the estuary. I tell them that the Atlantic salmon's scientific name, *Salmo salar;* means "leaper," or "jumper salmon."

"Why? How high can a salmon jump?" one boy inquires.

"As high as 11 feet," I respond confidently. "Some of them, anyway."

"Eleven feet!" The boy looks dubious. "That high? Prove it!"

I gulp. Then I look down at the blue tarpaulin Sean and I are standing on. Some fifteen stylized "fish" on it indicate that this is a "pool" from which we are holding our "stream-side chat" with the children. "Sorry," I say, "I would, but this pool isn't deep enough. I'd need a good 'running start' in the water."

Our young skeptic looks down at the "pool." "Yeah," he agrees, "you're right."

Today's presentation is part of the Atlantic Salmon Egg Rearing Program in Western Massachusetts, known throughout the basin as the Salmon-in-the-Schools Program, involving the U.S. Fish & Wildlife Service and its partners who are engaging thousands of students in over 100 schools in Connecticut, Massachusetts, New Hampshire, and Vermont in learning what it means to be a steward of a national trust species, Atlantic salmon. They are learning first-hand what it takes to incubate salmon eggs, how to manage their growth and development once hatched, and where the fry should be stocked to maximize their chances for survival as part of the Connecticut River Atlantic Salmon Restoration program.

For more information on the Atlantic Salmon Egg Rearing program, the environmental education program in western Massachusetts, check the website: http://www.fws.gov/r5crc/salmon/workbook/index.htm.

Photos: USFWS

Schoolchildren talk with a salmon and a snorkeler.

Salmon-in-the-Schools is an interdisciplinary education program that works at all grade levels and strongly supports math and science curriculum requirements. Demand for the program exceeds core partner capacity to deliver it despite start-up equipment costs that run around $850 and requires annual training for teachers.

A variety of partners, both government and non-government, have come together to empower students to accept a shared responsibility for protecting their own natural community. Teachers and classroom volunteers are particularly key to this coalition. Other critical partners include the Connecticut River Salmon Association, Trout Unlimited, the Southern Vermont Natural History Museum, and the natural resource agencies of Connecticut, Massachusetts, New Hampshire, and Vermont.

The students and their parents assist in stocking millions of Atlantic salmon in rivers throughout the Connecticut River watershed, including those reared in their own classroom. The students learn about the fisheries program and then implement what they've learned by involving the community through writing letters to the editor of their local papers, hosting Congressional visits in their schools, organizing stream clean-ups, evaluating the health of their own rivers, and becoming protective guardians of the aquatic habitat in their communities.

All this effort is in a very good cause. Flowing some 410 miles from its headwaters at the Canadian border to Long Island Sound, the Connecticut River forms the backbone of the largest river ecosystem in New England. By the mid-Twentieth Century, damming and industrial dumping earned it common designation as "the nation's best-landscaped sewer." Now Atlantic salmon, long extirpated from the system by the dams, are returning, thanks to a cooperative effort that includes hatchery releases of salmon and a series of fish ladders allowing migratory passage once again within a watershed that is slowly being restored to health. The Salmon-in-the-Schools program is helping to shape a generation of citizens who will care for the Connecticut River as one of America's invaluable natural resources.

Poster Child for Environmental Education in the 21st Century

Photograph: Gene Nieminen / USFWS

Monarchs rest on a pine branch in Cape May, New Jersey as they migrate south to Mexico.

Erik Mollenhauer, Global Connections Coordinator, Educational Information and Resource Center

If it takes a village to raise a child, perhaps a butterfly can bring that village together—a butterfly with a unique story. Each fall, monarch butterflies (*Danaus plexippus*) from the United States and southern Canada begin an epic migration that takes them 2,000 miles to Mexico. The following spring, their children and grandchildren return. The big issues of the 21st Century—global warming, deforestation, biodiversity loss—know no boundaries. Just so, the monarch traverses multiple borders, languages and cultures during its journey. Thus, the monarch butterfly might well serve as a poster child for environmental education in the global 21st Century, for no one nation can either preserve monarchs or solve the big issues alone. It takes a global village to solve global problems.

With their colorful wings, butterflies have fascinated people for probably thousands of years. Putting this fascination to good use, in August 2001 the Educational Information and Resource Center (EIRC), a New Jersey public agency, offered an innovative three-day teacher workshop: "Teaching and Learning with Monarch Butterflies." The goal of that workshop was simple but far-reaching: to foster the development of a land ethic by providing teachers with knowledge, skills, and materials. Most importantly, the workshop encourages the passion to create an outstanding learning experience about monarchs. The importance of passion in education is often overlooked. Yet Aldo Leopold, a giant of the conservation movement, noted:

"It is assumed that if we reach good people with good educational materials, that good results will follow. I wonder if this does not over-simplify the problem. . . . Acts of conservation without the requisite desires and skills are futile. To create these desires and skills, and the community motive, is the task of education."

For more information about Monarch Teacher Network and dates/sites of teacher workshops, go to www.eirc.org or contact Erik Mollenhauer at erikm@eirc.org or 856/582 7000.

Monarchs find a friend in Mexico.

Mexican schoolchildren learn monarchs' migration routes.

Migrating monarchs fill the air with fluttering colors.

Photographs this page: Monarch teacher Network

Since 2001, nearly 1,600 teachers and other educators have been trained at EIRC's monarch workshops. Workshop activities explore milkweed (*Asclepias syriaca*—the monarch's host plant) and the "milkweed village" of insect grazers, predators and parasites that inhabit milkweed meadows. Teachers also explore issues that threaten monarch migration to Mexico, including land-use changes and development in the U.S., the spread of lawns and insecticide use, and the impact of deforestation and global warming in Mexico.

For many, the workshops have been transformative. Their voices speak of the impact, passion, and hope aroused by the project:

"What I learned will forever change the way I approach my teaching."

"By far the best workshop in my 27 years of teaching."

"This has given me hope that teaching can once again include wonder, hope, and fascination."

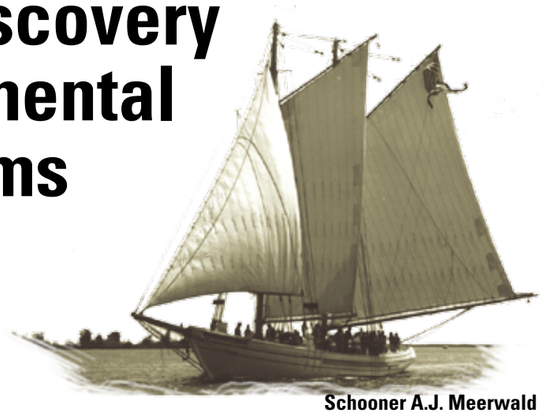
"What we didn't expect was how profoundly the experience would move us and change us in ways we are still discovering . . . ."

The workshops encourage teachers to include Mexican history and culture in their curriculum. Perhaps even more importantly, studying monarch butterflies motivates students to learn Spanish, a language that is becoming increasingly valuable to U.S. citizens.

Workshop graduates comprise a growing Monarch Teacher Network (MTN) that is spreading to states and provinces beyond New Jersey. In August 2003, MTN conducted its first Ontario workshop, leading to the formation of Monarch Teacher Network – Canada, with a three-year commitment from the Weston Foundation in Toronto (MTN is funded by the Geraldine R. Dodge Foundation). More monarch workshops are planned for New Jersey, Connecticut, Ohio, Virginia, Ontario, and Manitoba. Each workshop is taught by veteran MTN teachers who volunteer their time and passion to bring the monarch story to other teachers. Workshop graduates can apply for one-week, fellowship-supported MTN experiences in Mexico that deepen their knowledge of the monarch's life cycle and the threats to monarch habitat.

Probably many of us would agree that our lives have been enriched by the monarch butterfly. Preserving this species for the enjoyment of our children and grandchildren is good in and of itself. But the MTN goes a step further by using studies of the monarch to shape a land ethic that can inform all other efforts to protect native species, truly making the monarch butterfly a good poster child for 21st-century environmental education.

The Bay Shore Discovery Project's Environmental Education Programs



Schooner A.J. Meerwald

Meghan Wren, Executive Director, Bayshore Discovery Project

What's it like to sail a schooner? Thousands of lucky New Jerseyans who have had the privilege of voyaging aboard the State's Official Tall Ship, the A.J. Meerwald, can tell you. 'Sailors' of all ages—4th-graders, college-students, 40-somethings, octogenarians—are in a heightened state of awareness from the moment they step aboard the 115-foot schooner. Their comfort level is challenged, they're in unfamiliar territory, the 'fabric' of the past surrounds them, and their senses are bombarded from all directions.

As voyagers set sail, they see their land from the water, many for the first time; they accomplish something as a team that each could never do alone: raising over a ton of canvas. They hear the pounding of water against oak that sailors have experienced for centuries; they feel the elements, whether raw and uncompromising or warm and glorious; they touch the fish that they personally haul from the bay, ocean, or river; and they see evidence of people and their carelessness impacting a sensitive environment—right before their eyes.

Why use a tall ship for environmental education? The A.J. Meerwald is an ideal learning platform for a multitude of reasons. Like most outdoor experiential learning, the sail is fun, exhilarating, and eye-opening, but aboard the Meerwald, there is the added spice of the romance of the sea, the intrigue of a bygone era and a healthy dose of the tantalizingly unknown. The Meerwald's annual "range" is from her homeport in Bivalve, up the Delaware River to Burlington, around Cape May and as far north as Alpine.

Any tall ship can be an inspiring classroom. Still, a great environmental education program must have a carefully developed curriculum, structured logistics, and excellent educators. The 3-hour shipboard education programs of the Bayshore Discovery Project, which owns and operates the Meerwald, are finely choreographed to make best use of the short time aboard yet have enough flexibility to capture 'teachable moments' generated by the mix of the environment, the ship, and the curiosity of the students. Once onboard, the class is introduced to the Meerwald and her historical context, becomes acclimated to the surroundings, and helps to raise the sails.
Next; educators split each class into 4 small groups that rotate among 4 education stations selected by the teacher from the following options: Watershed, Trawl, Plankton, Water Chemistry, Petroleum, Wetlands, and Oysters. Every sail includes a guided Observation period and 'Closing' to reinforce lessons learned.

The Meerwald under full sail.

Photos: George Schupp

Young students weigh anchor for the voyage.

The Meerwald's education programs address New Jersey's Core Curriculum Standards, incorporate hands-on activities in each lesson, have no more than a 1:10 educator: student ratio, and use an inquiry-based approach. The curriculum content has been researched and written specifically for the Delaware Estuary and New Jersey's Atlantic Coast. Each station builds on experiences, experiments, data and concepts toward the following 'key points': accountability/ personal choices, teamwork/cumulative effects, sense of place/watershed address, and awareness of surroundings/ being in the moment. Concepts taught include bio-accumulation, non-point source pollution, indicator species, interdependence, and stewardship.

A large number of the classes served by the A.J. Meerwald are from poor, urban areas or other under-served populations. For many, this trip is their first experience on the water and/or first field science experience–many will not have another opportunity for a very long time, if ever. The education platform that the Meerwald provides is an intense, highly successful learning environment. Besides the 3-hour "voyage," the Meerwald "crew" also conducts day camps, week-long summer camps, public sails, tailored charters, and also partners with groups looking to provide an experience of a lifetime for their constituency. We're thrilled to have completed our twelfth season—introducing this tall ship experience to over 50,000 students!

Founded in 1988, the Bayshore Discovery Project, operator of the 115' schooner A.J. Meerwald, is a 501(C)3 education organization whose mission is to motivate people to take care of the environment, the culture and the history of New Jersey's Bayshore Region through education, preservation and example. The past 18 years have seen the Bayshore Discovery Project grow from a handful of dedicated individuals to a well-respected institution delivering outreach programs to over 5,000 students each year. Bayshore Discovery Project works through three educational venues; shipboard programs on the historically restored oyster schooner, A.J. Meerwald; shore-based programs at the Bivalve Center; and outreach programs including events, publications and school-based activities. Entwined through all three programming venues, is 'leading by example' - adopting and conspicuously displaying sustainability practices onboard the Meerwald and at the Bivalve Center.

"…the best source of feedback cannot be quantified … It's things like the expressions on the faces of the students as the experience unfolds – expressions of anticipation as they board the ship, amazement that the trawl line is wet, wonderment as they anxiously await to see what we caught, accomplishment as they admire the newly raised sails, intrigue as they ponder an educator's questions, pride as they correctly answer such question, fascination at the fact that we're still moving after the engine is turned off, cautiousness as they taste their first oyster, curiosity about what's next out of the water chemistry box, excitement about seeing plankton through a microscope and even disgust as they smell the clam plant passing by. It's the unexpected hugs from students and teachers as they leave because their expectations were so far exceeded. It's the subtle comments that students make throughout the sail letting us know that they are engaged. And it's meeting people that went on a sail a few years ago, either as a student or chaperone, and still remember it as the best field trip they ever had."

from the 2004 Education Program Report, Monica Halverson, Shipboard Program Coordinator.

You Can't Have One Without the Other

Curiosity and imagination motivate exploring nature.

Photos: Steve Hilldbrand / USFWS

Kathi Bangert, Assistant Regional Director for External Affairs
U.S. Fish & Wildlife Service, Northeast Region, Retired

"I like to play indoors better 'cause that's where all the electrical outlets are."

This quotation from a fourth-grader gives rise to a call to action issued by author Richard Louv in his book *Last Child in the Woods*.

According to Louv, the current generation of American children is suffering from "Nature Deficit Disorder." He attributes the rise in a plethora of maladies among the young, including obesity, type 2 diabetes, attention disorders, and poor educational achievement, directly to their isolation from the natural world. He has called for the development of a broad-ranging coalition to develop an action agenda for reconnecting children to nature. The Service's National Conservation Training Center, located in Shepherdstown, West Virginia, played a key role in this effort when it joined forces last September with Louv and The Conservation Fund to host "A National Dialogue on Children and Nature: A Connection for the Health and Well-Being of our Children."

Yet, while it is critical to educate our country's future citizens about their natural world, it is even more urgent to teach their parents. Some environmental issues that face our world—habitat destruction, dwindling water supplies, climate change—are upon us and must be dealt with expeditiously.

In the 2005 report, "Environmental Literacy in America," the Roper Foundation and National Environmental Education and Training Foundation found that, across all socio-economic and educational strata, the environmental consciousness of 80 percent of Americans is influenced by "inaccurate or outdated environmental myths." Disturbingly, the report goes on to note that "There is little difference in environmental knowledge levels between the average American and those who sit on governing bodies, town councils, and in corporate board rooms, and whose decisions often have wider ramifications on the environment." This finding spells trouble for solving the complex environmental problems of the future, whose resolution will of necessity depend less on "experts" and more on ". . . the efforts of more skilled non-experts acting as individuals, through small businesses, or as community leaders."

According to National Environmental Education and Training Foundation, the media are an important environmental education source for all ages: ". . . children get more environmental information (83%) from the media than from any other source. For most adults, the media [are] the only steady source of environmental information." This is why it is critical for the Service and other environmental educators to tell their stories in the media. How will we dispel those environmental myths that 80 percent of the American public believe unless we go directly to their primary source of information?

A recent article in the Pittsburgh Post Gazette entitled "Ignore Media at Your Own Risk" contends that both private and public sector entities benefit by making themselves available to the media. "Even when the news is bad," the Post Gazette wrote, "the news media are giving the organization the means to defend itself or give its point of view."

The National Environmental Education and Training Foundation report notes that the news media educate generally but not in depth. Environmental education continues to need traditional pedagogies. However, given the pervasiveness of the media in American society, media outreach is likely to become even more crucial as a tool in shaping public environmental literacy. Environmental organizations, including the Service, will need to develop increasing sophistication in media relations. Any new tool can seem complicated, perhaps even dangerous. But training and practice result in proficiency.

Students Explore the Coastal Ecosystem

Educators explore a wetlands, recording their experience with cameras.

Eric Simms, Science Education Specialist, Scripps Institution of Oceanography

Lisa Auermuller, Watershed Coordinator, Jacques Cousteau National Estuarine Research Reserve

Unlike the challenge faced by many teachers, capturing the interest and attention of the audience is easy as a marine science educator. In fact, I rarely encounter children or adults who lack an innate curiosity about the marine environment. But as any effective educator knows, successfully promoting awareness and understanding of a topic must go beyond engaging content to include effective practices for delivery of that content.

For more than a decade, students in over 50 schools and districts throughout New Jersey have used their natural excitement and curiosity about the marine environment as a vehicle for interdisciplinary learning through the Marine Activities, Resources and Education (MARE) program. The MARE program engages students in the exploration of different marine environments using a whole school approach. Learning is achieved through the disciplines of earth, life and physical science, as well as mathematics, social studies, language arts, and the visual and performing arts.

Developed by leading science and education professionals at the Lawrence Hall of Science at the University of California at Berkeley, MARE combines effective instructional materials and professional development to promote language, science, environmental, and ocean literacy. Teachers at MARE schools integrate the supplemental, thematic program at their own pace throughout the year, engaging their students in the discovery of marine habitats through simple but effective inquiry-based, hands-on activities. The program resources are aligned with and support the American Association for the Advancement of Science's Project 2061 Benchmarks for Science Literacy, the National Research Council's National Science Education Standards, and the New Jersey Core Curriculum Standards for math, science, language arts literacy, social studies, arts, and physical education.

Based on extensive professional evaluation of the program, the whole-school implementation approach is one of the most effective aspects of MARE. Whole-school implementation results in building a strong sense of community both within and outside of the school environment. Central to this approach is the inclusion of intensive Ocean Immersion events that involve faculty and all students, parents, and the larger community.

In addition to fostering formal education skills and conceptual understanding, MARE also promotes environmental stewardship by demonstrating direct connections between students and the marine environment regardless of geographic location. In addition to classroom activities, the program encourages educators and students to explore connections between their local aquatic environments and the larger global ocean through field trips and the exploration of relevant environmental issues. Recent student evaluation results have also indicated correlations between long-term MARE schools and elevated scores on state language arts tests.

The requisite group photograph.

For more information about the MARE program in New Jersey please visit
http://www.jcnerr.org/education/index.htm

A class in seining techniques.

Photos: JCNERR

Environmental Education Isn't Just Science

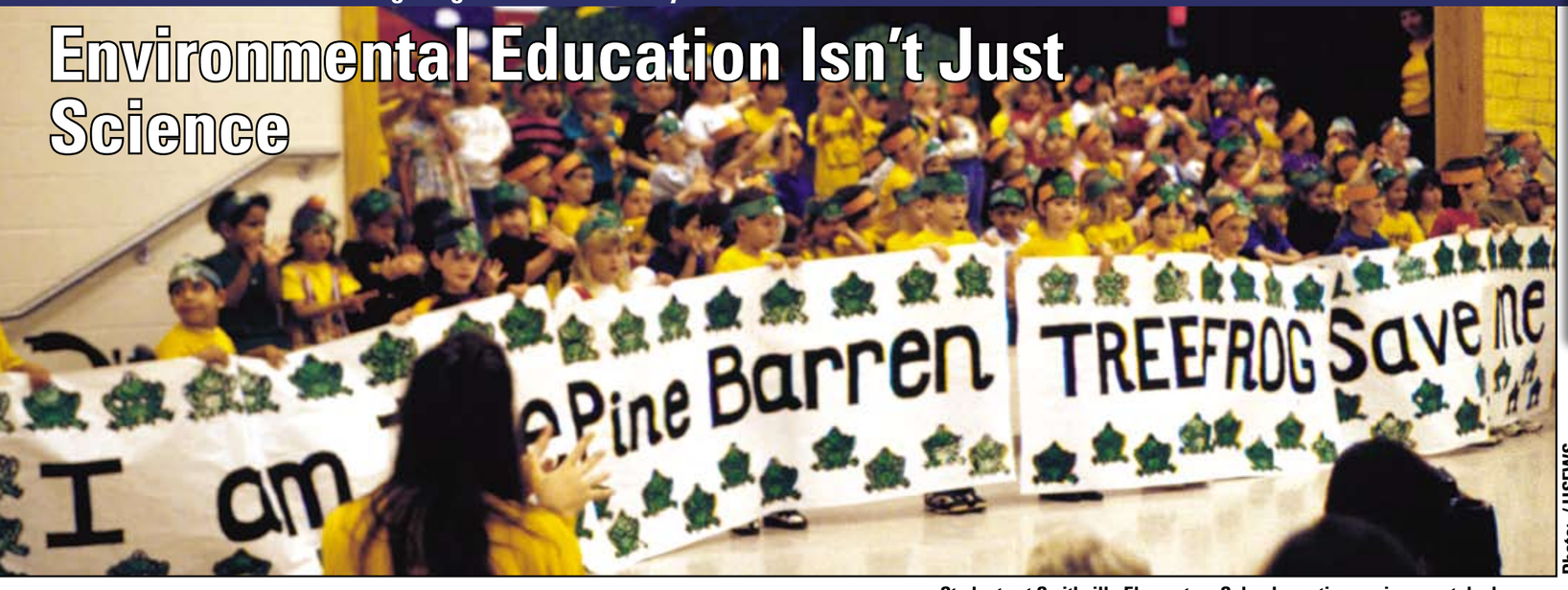


Photo: / USFWS

Students at Smithville Elementary School practice environmental advocacy.

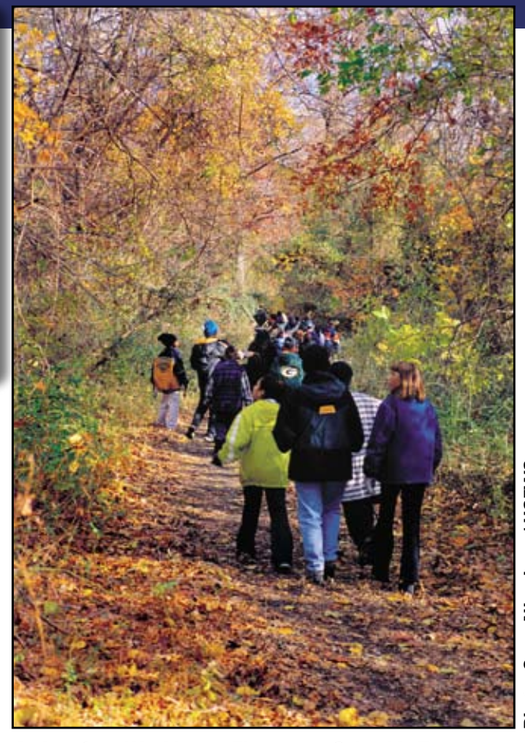


Photo: Gene Nieminen / USFWS

A class from Washington Elementary School in Trenton hikes through the Hamilton-Trenton Marsh.

James Cramer, Ph.D., Communications Specialist and Writer-Editor, New Jersey Field Office

Over a decade ago the U.S. Fish & Wildlife Service and the National Fish and Wildlife Foundation initiated a new concept for environmental education focused on communities and schools. In 1994 the New Jersey Field Office became one of the first to sign on to the new Earth Stewards, now known as The Nature of Learning. U.S. Fish & Wildlife Service field stations were to partner with individual schools in a three-year program to integrate environmental studies into the curriculum. The theory was that at the end of the three years, environmental issues would be so intrinsic to the school's educational vision that there would be sufficient interest to continue the program independently.

In the 12 years since, the New Jersey Field Office has partnered with Washington Elementary School in Trenton, Smithville Elementary School in Galloway Township, Stafford Township Intermediate School in Manahawkin, and Pinelands Regional High School in Tuckerton. Whatever the level, the challenge remains the same: to engage teachers not just of science but of all the disciplines in sensitizing students to the need for protecting the natural environment. If science classes are a student's only contact with environmental concerns, the field of experience is relatively narrow, and the effect is correspondingly limited. Expand the scope of the environmental emphasis by increasing the areas of exposure, and the impact is much more apt to influence the learner permanently.

All disciplines offer pathways to ecological concerns. For example, *Walden, or Life in the Woods*, Thoreau's account of living in harmony with nature, is already standard fare in high school literature classes. Landscapes have been a staple of art education since the Romantics. History classes can study changing attitudes toward the natural world. Statistics and mathematics supply crucial tools for measuring and characterizing the environment.

Field trips are essential to The Nature of Learning because an important component of the three-year program is outdoor classrooms that engage students in hands-on encounter with the natural world. But no Nature of Learning field trip is exclusively scientific. For instance, at Whitesbog, lessons in the history of the local cranberry and blueberry industry figured in the presentations to young learners. History featured even more prominently at the Hamilton-Trenton Marsh, home to aboriginal encampments and after 1815 to the brother of Napoleon Bonaparte.

Our program at Stafford Township Intermediate School in Ocean County further illustrated the interdisciplinary character of The Nature of Learning. One aspect of Stafford's program was a partnership with *Hooked On Fishing—Not On Drugs*, sponsored by the Future Fishermen Foundation. The initial contact for this program was a physical education teacher interested in acquainting students with a form of exercise providing lifelong enjoyment even for the "non-athletic." For two days every May at Manahawkin Lake, Stafford's fifth-graders are exposed to a series of fishing activities that are as much about sports as natural science. At the same time, a key component of the Stafford Nature of Learning program was the construction of an extensive, on-campus rain garden/outdoor classroom that will feature native flora but also include a pine to be decorated annually as the school's "holiday tree."

The Nature of Learning is all about holistic education, which is perhaps our best hope for raising a new generation of environmentally aware adults. In New Jersey, not only the Field Office but also E. B. Forsythe and Great Swamp National Wildlife Refuges are available to partner with interested schools. To learn more, just give us a call.

Educating Environmentally Friendly Urban Planners

John Hasse, Ph.D., Assistant Professor of Geography, Rowan University

Many environmentally-oriented college students have little initial interest in a course on urban planning. In their perception, cities are places with pollution, traffic, overcrowding and lost natural environment. Therefore, to them a course in urban planning must mean a course where one learns the skills that may contribute to environmental degradation. Most of these students are surprised to learn that urban planning is one of the most significant ways that one can have a profound effect on preserving the environment.

Inefficient and dispersed patterns of urban growth (*i.e.*, sprawl) are impacting environmental resources at an unsustainable rate. In recent decades in New Jersey shopping malls and subdivisions have been consuming farmland, forests, wetlands, and other open spaces at the magnitude of 50 football fields per day. Each acre that is poorly developed represents lost habitat, lost ground water recharge, and lost open space. The greatest threat facing the environment in a highly populated state such as New Jersey is not necessarily urban development *per se* but the pattern of development.

No longer can we teach urban planning and environmental protection as separate disciplines. The old model of land as viewed in bipolar terms of "urban" and "rural" is shifting to a new paradigm of holistic planning in which land is understood as a complete functional system rather than a collection of separate parts. A successful urban design must adequately and eloquently provide the urban functions of housing, transportation, business and cultural institutions but must also fit within the limitations of the environmental systems of watersheds, wildlife habitats, ecosystems, and soils.

The first steps in urban planning must be to understand the underlying environmental functions of a location. Geographic Information Systems (GIS) is an invaluable tool for this purpose. A GIS permits a planner to map and evaluate the naturally occurring systems of a site allowing analysis of geology (*e.g.*, soil types, prime farm soils, hydric soils), hydrography (*e.g.*, streams, water bodies, flood planes, wetlands) and ecology (*e.g*, land ecotomes, threatened and endangered species habitats, wildlife corridors, natural heritage sites). Planners of the future must be well-versed in ecology and environmental science.

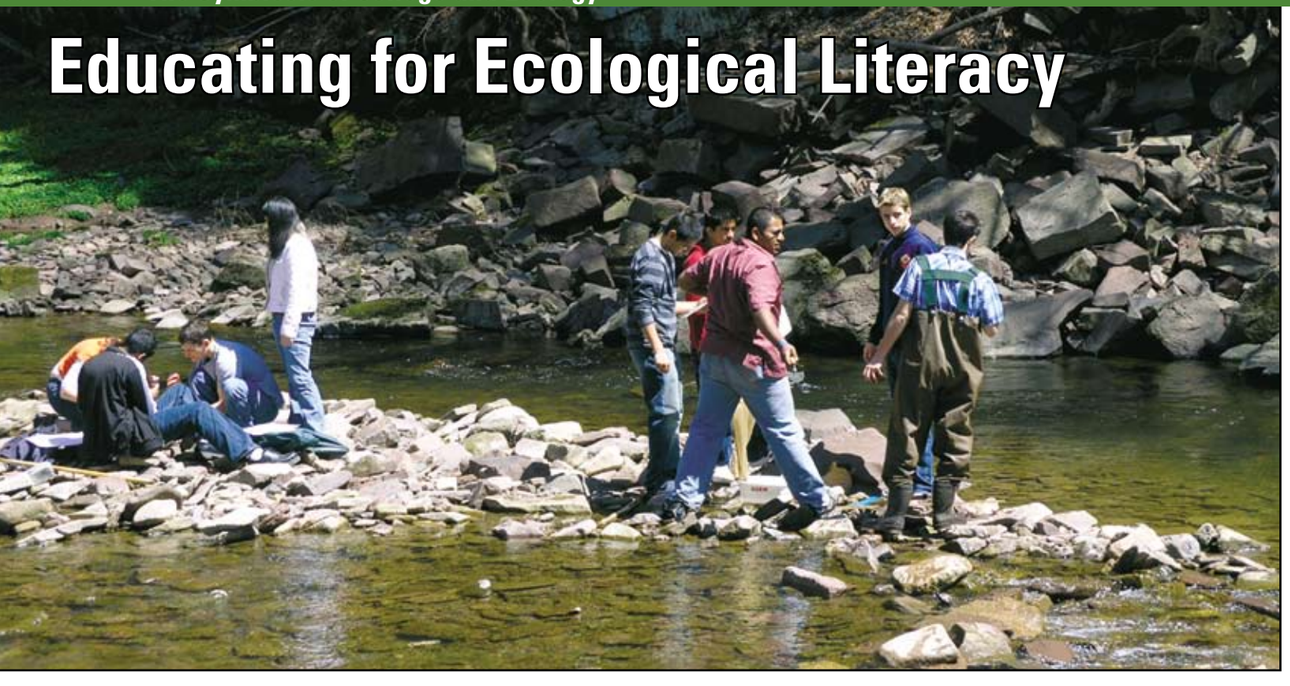
Photos: Hasse

"Poor planning . . . results in dysfunctional human habitat such as sprawl, which is wasteful, inefficient, and socially segregating. Excellent urban planning is really the art of designing 'villages' . . . ."

In fact, the act of planning itself can be seen from an essentially ecological perspective as designing human habitat. Poor planning practice results in dysfunctional human habitat such as sprawl, which is wasteful, inefficient, and socially segregating. Excellent urban planning is really the art of designing "villages" with a sense of place, walkable streetscape design, functional transportation systems, mixed uses, and high-quality environments. Holistic planning integrates both the natural and human functions of a landscape with the goal of maximizing the functional systems potential of any particular site.

Ultimately, preserving the ecological and environmental integrity of New Jersey's landscape will occur only through intentional, holistic planning. Students taking urban planning courses at Rowan University are learning the importance of creating ecologically sound smart growth communities and avoiding sprawl. By the end of the semester, many once skeptical students become champions of urban planning as a field that plays one of the most important roles in preserving the environment.

Educating for Ecological Literacy



Janet A. Morrison, Associate Professor
Department of Biology, The College of New Jersey

Photos: J. A. Morrison

At the College of New Jersey, students actually "do" ecology.

We live in a period of profound, rapid ecological change resulting directly from human activity. Dense human populations result in large-scale conversion of natural landscapes to intensively managed agricultural systems and commercial/residential development; globalization promotes unprecedented worldwide transport of species from areas where they evolved to new territories; industry continually releases large quantities of new chemicals into ecosystems. All of these examples potentially have very complex, unpredictable consequences for the environment and our own well-being, yet we forge ahead, often without a solid understanding of these consequences. One reason is the common lack of adequate ecological education at the college level, and as a result many college-educated professionals in government and industry suffer from ecological illiteracy. Because ecology uses an objective, quantitative approach to study the relationships among living organisms and physical factors in very complex systems, it is the science best equipped to understand humans' role in our changing environment. Expanding college-level ecology education to engage more students, therefore, is one solution to the complex problems we face. Education will lead to better ecological understanding on the part of policymakers and industry leaders and also will equip more students for careers as environmental specialists.

Ecology is a science, so learning it demands that students actually do ecology, not just learn facts and theories from a textbook. All biology majors at The College of New Jersey take a required course called Ecology and Field Biology, in which they have ample opportunity to conduct studies in the field (or lab) that test ecological questions. A few recent examples of student studies have examined how different intensities of land use by people affect insect communities, which environmental factors influence parasitism rates on the invasive wetland plant purple loosestrife (*Lythium salicaria*), and how water quality affects the distribution and abundance of freshwater macroinvertebrates. All of these studies took less than a semester and were at an introductory level, so their results had no utility in terms of actual ecological problem-solving, but their educational value was great. About 100 students each year have this intensive ecological experience at The College of New Jersey, which includes reading in the current scientific ecological literature and writing scientific papers in ecology. Each biology graduate that leaves The College of New Jersey, whether to enter medicine, the pharmaceutical industry, a government position, teaching, etc. is prepared to be an ecologically literate voter and decision-maker throughout her/his life.

This undergraduate exposure to ecological science always inspires some students to pursue ecology in a much deeper fashion; they take additional courses and may conduct research with a faculty member. These research experiences engage students for a year or more, usually result in presentations at scientific conferences, and sometimes are even published in scientific journals. Such work, of course, prepares students well to go on to advanced study in ecology or even to enter an environmental profession directly. For example, one student who conducted research with me on garlic mustard (*Alliaria petiolata*), an invasive forest plant, now is pursuing a Ph.D in ecology to study how human alteration of forested landscapes affects migratory birds in the neotropics. Another student who studied garlic mustard and a second invasive plant, Japanese stilt-grass (*Microstegium vimineum*), went to work directly for the Natural Resources Conservation Service on sustainable agriculture and subsequently became a high school science teacher, where she will pass along her ecological literacy to her own students. Two students who conducted research with me on plant-insect interactions and invasive plants worked for the New Jersey Department of Agriculture's Beneficial Insect Laboratory upon graduation, and have now begun Ph.D programs to extend their training in the ecology and evolution of insects and plants. Accomplished students such as these, well-educated in ecological science, offer our best hope for learning how to re-shape American society for maximum ecological sustainability.

The Common Denominator for Environmental Challenges

Tanya Oznowich, Environmental Education Supervisor
New Jersey Department of Environmental Protection

To learn more about the work of the commission and/or to get involved with this valuable undertaking, visit the commission Web site at www.nj.gov/dep/seeds/njcee/index.htm or contact Tanya Oznowich, NJDEP Environmental Education Supervisor, at 609/984 9802 or Tanya.Oznowich@dep.state.nj.us.

The work day begins along the Newark Bay.

As the Nation's most densely populated state, New Jersey faces a plethora of environmental challenges. Smart growth, habitat protection, stormwater management, sustainable development, and a host of other issues tax our capacity to protect—and, in many cases, restore—the natural environment. Understanding each challenge involves recognizing the complex web of connections that exist among human activities, such as land use, waste and pollution, and nature, and comprehending how these connections affect the quality of both natural resources and, in some cases, human health.

Solutions for these challenges are sophisticated and complex. It's not enough these days for society to rely solely on top-down regulatory actions regarding environmental protection and natural resource management – the actions of each individual can either contribute toward an existing environmental challenge or help to reduce or prevent it. According to the national Environmental Education and Training Partnership, "Environmental literacy is the desired outcome of environmental education programs. Environmentally literate individuals understand both ecological and social-political systems and have the inclination to apply that understanding to any decisions that pose consequences for environmental quality."

The New Jersey Commission on Environmental Education, the New Jersey Department of Environmental Protection, and the Alliance for New Jersey Environmental Education are working closely with numerous partners to advance environmental education for all ages throughout New Jersey. These collective accomplishments over the past 20 years are substantial, but there is renewed urgency among state, national, and global interests to nurture a more environmentally literate public through environmental education.

Findings for this growing phenomenon are detailed in the National Environmental Education Training Foundation's 2005 report covering 10 years of studies with the Roper Foundation and others, Environmental Literacy in America. Author (and former National Environmental Education Training Foundation President), Kevin Coyle, writes: "While the simplest forms of environmental knowledge are widespread, public comprehension of more complex environmental subjects is very limited. The average American adult, regardless of age, income, or level of education, mostly fails to grasp essential aspects of environmental science, important cause/effect relationships, or even basic concepts such as runoff pollution, power generation and fuel use, or water flow patterns."

Mallards take flight.

A tugboat transports dredging spoils to a disposal site.

Pipes exposed at low tide.

Photos: Gene Nieminen / USFWS

New Jersey was one of the first states in the country to implement a statewide environmental education master plan back in the early 1990s; the document was titled Environmental Education in New Jersey: A Plan of Action. The goal of revisions to this plan, now underway, will be to "encourage an environmentally literate citizenry." While gathering input for the revisions, the commission and New Jersey Department of Environmental Protection held numerous focus group meetings with Alliance for New Jersey Environmental Education members and other constituents. Results called for increased activity in such areas as coordination, promotion, support for new programs and best practices, increased enrichment opportunities, and monitoring of related activities. Four theme areas were also suggested; each will feature learner objectives, targeted audiences, timeframes, and strategies for implementation:

1. basics of ecological systems;
2. keeping human and ecological systems healthy;
3. stewardship and community involvement; and
4. planning, making decisions and solving problems for today and tomorrow.

A draft version of the revised plan will undergo a public hearing process this autumn with the final plan to be presented in spring of 2008 to the Governor, cabinet members, the New Jersey State Legislature, and leadership in the environmental and education areas.

Unit Scientists Team Up for Graduate Education

Recording data in the field.

Byron K. Williams, Chief, Cooperative Research Units Program, United States Geological Survey

In 1935, the Department of the Interior moved to fill the need for more trained biologists and a greater understanding of wildlife management issues by creating what it called Cooperative Research Units. The program which developed from this initiative was formally sanctioned in 1960 with the enactment of the Cooperative Units Act (PL 86-686). A unique model of cooperative partnerships among federal and state governments and academia, the program consists of 40 Cooperative Fish and Wildlife Research Units on university campuses in 38 states. Most units are located at land grant universities and share the land grant university's mission of providing applied knowledge and decision-making tools to benefit the public. In the mid-Atlantic States, the program currently includes units at Cornell University, Pennsylvania State University, the University of Maryland Eastern Shore, and Virginia Polytechnic Institute and State University. The U.S. Fish and Wildlife Service is the program's principal Federal client. Cooperative Research Units work closely with the Service to identify and address information needs required to manage the Nation's fish and wildlife resources effectively.

The program focuses on graduate education, with unit scientists appointed as members of graduate faculties at the universities where units are located. Unit students engage in research on fish, wildlife, and natural resources as part of their graduate degree programs, with unit scientists serving on graduate committees, typically as committee chairs.

Careful!
Even a juvenile raptor can inflict damage.

Students examine a specimen.

Seining for samples.

Photos: USGS

The activities of a Cooperative Fish and Wildlife Research Unit are governed by a local Coordinating Committee of Unit Cooperators, who share resources and authorities in directing unit activities. The Coordinating Committee plans and directs unit operations, approves graduate courses and other training activities of unit scientists, and periodically reviews progress on graduate research projects.

Graduate research projects cover a broad spectrum of ecological and management issues. For example, unit scientists and their students are investigating the effects of habitat fragmentation, disturbance, and other factors on populations of waterfowl, shorebirds, and neotropical migrants. Research is ongoing on freshwater mussels, a wide variety of endangered species, and several large mammals such as white-tailed deer (*Odocoileus virginianus*) and black bear (*Ursus americanus*). Work is underway on the physiology and movement patterns of anadromous and freshwater fish. Unit scientists are also investigating the impacts of large-scale management activities such as mountain-top removal, acid rain deposition, and stream alteration and pollution. In all, there are more than 1,100 projects nationwide with over 600 participating students.

Program graduates are in high demand by federal and state agencies, and many of the states that currently do not have a unit are actively seeking to establish one. The Cooperative Research Units program is now widely recognized as a winning formula for training future resource professionals while at the same time integrating science and management within the Department of the Interior.

Environmental Education and Survival of the Species

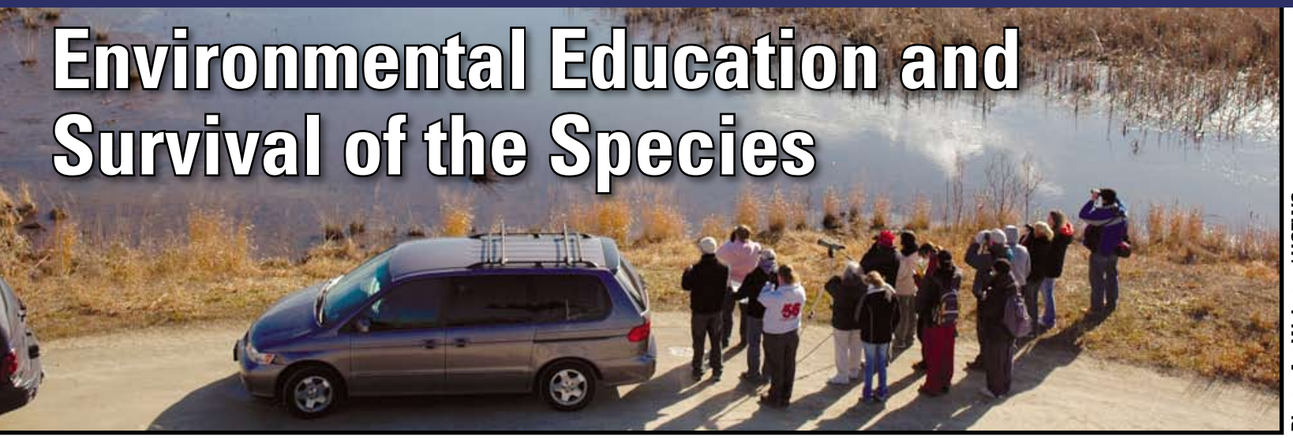


Photo: Art Webster / USFWS

Bird-watching as adult education at Edwin B. Forsythe National Wildlife Refuge.

Photo: Carl Zitsman / USFWS

Environmental education in classroom and forest at the U.S. Fish and Wildlife Service's National Conservation Training Center.

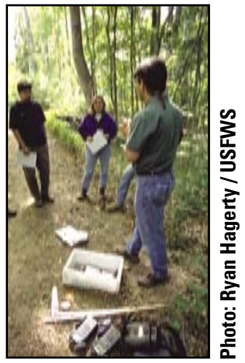


Photo: Ryan Hagerty / USFWS

Photo: Art Webster / USFWS

Schoolchildren use microscopes at Edwin B. Forsythe National Wildlife Refuge to learn by seeing.

Clifford G. Day, Supervisor, New Jersey Field Office, Retired

Western science and specific scientific subjects began to form about 500 and 175 years ago, respectively. Wildlife biology, a relative newcomer into this fold, developed in the early part of the last century. Initially involved with episodes of over-exuberant specimen collecting and some husbandry attempts, wildlife biology has become much more sophisticated with focus on biodiversity or impacts to fauna through disciplines such as ecotoxicology. In the 1960s people started to take more interest in their environment and began asking questions and learning. Coincidentally, environmental education began to evolve during the era of major legislation such as the National Environmental Policy Act (1969) and the Endangered Species Act (1973). Environmental education received national recognition with the passage of the Environmental Education Act of 1990.

Faced with today's environmental problems, societies cannot be sustained without the beneficial results of environmental education. Teaching about the natural world and its interrelationships will influence thinking that will carry over to other professional pursuits. Long-term results are best achieved when environmental education is focused on all ages and across all socioeconomic levels. Education offers a valuable tool for fostering a deeper understanding of the living world and eventually influencing environmental decisions, such as land use. Teaching can be formal or informal, ranging from pre-school to a graduate program, but is more effective when it begins early. The U.S. Fish and Wildlife Service is promoting efforts to reconnect youth with nature through more outdoor activities.

Being multi- and inter-disciplinary, environmental education has a wide-ranging curriculum. Although based in the life sciences, it includes many disciplines and can pair diverse topics such as ecology and sociology. The level of environmental literacy desired can range from casual nature study to sophisticated scientific research, but the objective is to instill an understanding of fundamental biological concepts that can transcend to making more responsible land-use decisions, as well as perceiving the societal implications of healthy vs. unhealthy ecosystems.

Our goal is to generate environmental literacy; to educate the public to be able to understand, explain, and to apply basic scientific information to problems and decisions. Progression toward achieving this goal is through our educational system.

Pre-college curricula offer a good entry point for students to comprehend and experience basic biological field sciences. Students should be taught the scientific method and its applicability to answer questions and validate facts. Curricula also need to incorporate the development of communication skills, particularly writing, which needs to be emphasized through graduate levels. Certainly, future environmental scientists will need to write for a diverse audience, and their ability to communicate effectively in writing will greatly influence perceptions. Similarly, the development of critical-thinking skills must be emphasized. Writing and critical thinking provide the ability to organize material, reason, and promote an argument. The argument leading to defensible conclusions has consequences in land-use decisions and natural resources management.

Environmental education at the pre-college level needs curricula that require more than a test of memorization. In addition to field biology it needs to endorse scientific integrity and the application of the scientific method as reliable information detectors. We must correct any misconceptions about fish and wildlife biology. Accurate information is essential; witness the debates and misinformation surrounding local issues such as black bear management, cat neuter-release programs, and introduced species. The untutored eye in field biology is usually naive about wildlife. Major misperceptions about wildlife by policy makers and the public will distort views and hence adversely influence curricula, policies, funding, and land-use decisions.

Environmental education offers an antidote to help stem the loss of our natural resources. It provides insight on the way, we, as a species, interact with the environment and discourages apathy and complacent attitudes. Unlike other well-meaning quests, its application requires a behavioral change, not simply by promoting but implementing on-the-ground standards on what are acceptable air and water quality, land uses, and wildlife management practices. Consequently, responsible decisions on land use and wildlife will come out of a society more knowledgeable of basic biological principles.

The U.S. Fish and Wildlife Service views environmental education as all forms of multi- and inter-disciplinary teaching, targeted to all ages and socioeconomic groups, to influence and encourage informed and beneficial participation in sustaining and safeguarding native wildlife and their supporting ecosystems. One of the U.S. Fish and Wildlife Service's top priorities is connecting people with nature.

Environmental Education

Imperative of Hope

The critical role of environmental education right now has to be to inspire a generation of creativity that motivates all ages to begin radically transforming every one of our systems to make the transition to a sustainable society.

Gene Nieminen / USFWS

Wind power in South Jersey

Brian A. Day, Executive Director
North American Association for Environmental Education

Environmental educators have an obligation to help to inspire a generation of creativity using their skills, training, and commitment to looking at the world with a multidisciplinary action orientation. Perhaps as well as anyone on the planet, environmental educators see the environmental challenges that lie before us, and have the determination to turn these challenges into solutions.

We sit at the precipice of change. We can make this the most exciting generation in history, totally rethinking and transforming our energy, transportation, architecture, political, economic and education systems. This transformation is necessary to provide for everyone on the planet and protect our environment at the same time. As educators we have the exciting opportunity of not pushing a specific solution, but rather creating many solutions. We can do this through increasing environmental literacy–that is, people's understanding of the combination of factors that bring about environmental problems and solutions–so that each and every person can make personal life style and contribute to public policy decisions.
Often messages from the environmental movement are seen by the general public as negative or depressing. The critical role of environmental education right now has to be to inspire a generation of creativity that motivates all ages to begin radically transforming every one of our systems to make the transition to a sustainable society.

A lofty mission without the organizational infrastructure underneath it is a lost cause. The sustainability challenge requires as much intellectual infrastructure as it does a physical one, and it is the role of the environmental education community to build that intellectual foundation. But right here in the U.S. we have a long way to go!

In 1997, the Roper Starch Worldwide survey (sponsored by the National Environmental Education and Training Foundation) clarified that 95 percent of American adults support environmental education. The same survey showed that the percentage increased to 96 percent for parents. These numbers demonstrate the virtual universal support for our mission.

But the understanding of our population of the basic nature of environmental systems is woefully short. According to Kevin Coyle (Environmental Literacy in America, 2005), continued surveys have shown that "…45 million Americans think the ocean is a source of fresh water; 120 million think spray cans still have CFCs in them even though CFCs were banned in 1978; another 123 million people think that disposable diapers are the leading problems in landfills when they actually represent about 1% of the problem, and 130 million believe that hydropower is America's top energy source, when it accounts for 10% of the total." This shows how far we have to go to get the public ready to make good personal and public policy decisions.

People are searching for answers, and we have an obligation to lead them to good sources of knowledge. Transforming the environmental literacy of our citizens is paramount to long-term solutions to our problems.

Environmental education is positioned to lead the effort in a positive and exciting way that summons people to the challenge, ignites their creativity, and brings positive change. Environmental education can help support all the nonprofit, public, and private efforts to make critical environmental changes if we are strong and focused. We invite everyone to become more involved in understanding the interlocking social, political, economic, and natural systems, so we can be realistic about creative new answers that serve both people and the environment. Those of us alive today have the ability and the need to bring about more change than in all of human history. In fact, we have an obligation to do so! Please join us in a generation of creativity that improves life for all people and all species on earth. We can do it!